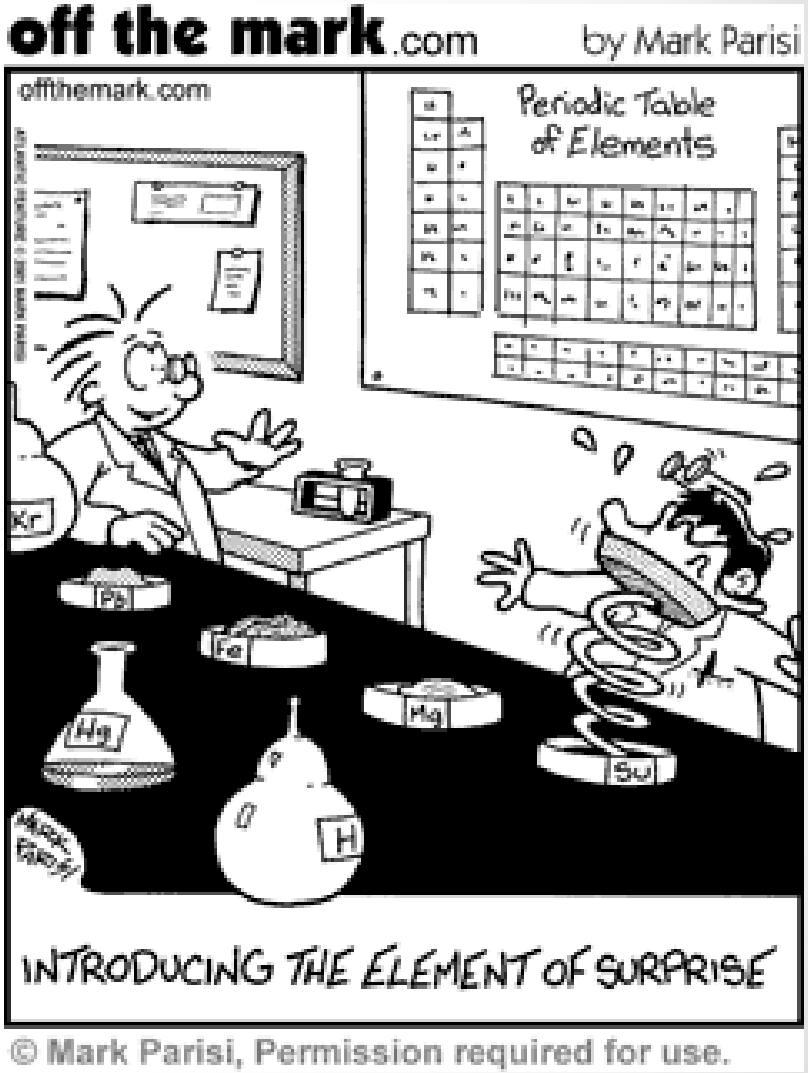
SL/HL 1 - Chemistry

- **Pregame:** Please take out your computer and log into my SyncronEyes Account in order to take the submitted quiz.



SL/HL 1 - Chemistry

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Outline

- Precision, Accuracy, and Uncertainty
- Units of measure
- Significant figures
- Zeros and Significant figures
- Scientific notation
- Metric System

Accuracy and Precision

Accuracy refers to the agreement of a particular value with the true value.

Precision refers to the degree of agreement among several measurements made in the same manner.

Types of Error

Random Error (Indeterminate Error) - measurement has an equal probability of being high or low.

Systematic Error (Determinate Error) - Occurs in the same direction each time (high or low), often resulting from poor technique or incorrect calibration. This can result in measurements that are precise, but not accurate.

Uncertainty in Measurement

A digit that must be estimated is called uncertain. A measurement always has some degree of uncertainty.

- Measurements are performed with instruments
- No instrument can read to an infinite number of decimal places

Significant figures or significant digits

- Digits that are not beyond accuracy of measuring device

- The certain digits and the estimated digit of a measurement

Rules for Sig Figs

- **Nonzero integers** (1,2,3, etc) always count as sig fig.
- **Captive zeros** (in between integers) always count as sig figs.
- **Leading zeros** (left of integer) do not count as sig figs.
- **Trailing zeros** (right of integer) only count if a decimal is included in the number
- **Exact numbers** (like 5 people) or **accepted conversions** (like 2.54 cm = 1 in) have infinite sig figs.

Rules for Significant Figures in Mathematical Operations

Addition and Subtraction: The number of decimal places in the result equals the number of decimal places in the least precise measurement.

$$6.8 + 11.934 =$$

$$18.734 \rightarrow 18.7 \text{ (3 sig figs)}$$

Rules for Significant Figures in Mathematical Operations

Multiplication and Division: # sig figs in the result equals the number in the least precise measurement used in the calculation.

$$6.38 \times 2.0 =$$

$$12.76 \rightarrow 13 \text{ (2 sig figs)}$$

Sig Fig Practice #3

Calculation	Calculator says:	Answer
3.24 m x 7.0 m	22.68 m^2	23 m^2
100.0 g 23.7 cm^3	4.219409283 g/cm^3	4.22 g/cm^3
0.02 cm x 2.371 cm	0.04742 cm^2	0.05 cm^2
710 m 3.0 s	236.6666667 m/s	240 m/s

Scientific Notation

For

REALLY BIG

or

really small numbers

Size does matter

In chemistry, we deal with some very

LARGE numbers like the mole:

$1 \text{ mol} = 6.022 \times 10^{23} \text{ atoms}$

We also deal with some very SMALL numbers like the mass of an electron:

$1 \text{ e}^- = 9.109 \times 10^{-31} \text{ atoms}$

Put each in proper scientific notation:

- 456.75×10^{18} g
- 8004500 mL
- 000405210 g cm^{-3}
- You get the idea……

Topic 1: Quantitative chemistry (12.5 hrs)

1.1 The mole concept and Avogadros Constant – 2 hrs

1.2 Formulas - 3 hrs

1.3 Chemical Equations – 1 hr

1.4 Mass and gaseous volume rel. in chemical reactions - 4.5 hours

1.5 Solutions - 2 hours

Enter Stoichiometry!

1.1 The mole concept and Avogadro's constant - 2 hours

- 1.1.1 Apply the mole concept to substances (2)
- 1.1.2 Determine the number of particles and the amount of substance (in moles).(3)